



W.P.723

Working Paper



MARINE AND INLAND FISHERY SECTORS IN
INDIA: ISSUES ARISING OUT OF
PRIVATIZATION OF COMMON PROPERTY
RESOURCES FOR ACCELERATING PRODUCTION

By

U.K. Srivastava

WP
1988/742

WP
1988/742

W P No. 742
May, 1988

The main objective of the working paper series of the IIMA is to help faculty members to test out their research findings at the pre-publication stage.

INDIAN INSTITUTE OF MANAGEMENT
AHMEDABAD-380015
INDIA

MARINE AND INLAND FISHERY SECTORS IN INDIA:
ISSUES ARISING OUT OF PRIVATIZATION OF COMMON
PROPERTY RESOURCES FOR ACCELERATING PRODUCTION*

U.K.Srivastava
Professor

Indian Institute of Management, Ahmedabad 380 015, India

ABSTRACT

The marine fishery resources are common property, theoretically accessible to all. However, due to cost and uncertainty of exportable resources, all types of boat owners tend to fish close to shore. Serious conflicts have been observed between the traditional and mechanized craft owners. Further, with the mechanization, decentralised landing places are giving way to more centralised landing and marketing places. Similarly, the inland fishery resources which are also common property, are now being privatized for the benefit of a few. This paper is designed to analyse Indian experience with emerging issues of equity, income distribution, employment and social tensions in the process of mechanization of marine fisheries and acceleration of production in inland fisheries.

*This paper is to be presented in symposium No. 8.3: EMERGING ISSUES OF COMMON PROPERTY RESOURCE USE at XII International Congress of Anthropological and Ethnological Sciences, Zagreb, Yugoslavia, July 24-31, 1988.

MARINE AND INLAND FISHERY SECTORS IN INDIA:
ISSUES ARISING OUT OF PRIVATIZATION OF COMMON
PROPERTY RESOURCES FOR ACCELERATING PRODUCTION

U.K. Srivastava*

Common property resources are the resources accessible to entire community and to which no individual has exclusive property right. These resources play a particularly significant role in the life of rural poor in developing world (Jodha 1983, 1986).

The classic article of Hardin (1968) on the tragedy of Commons has articulated the major issues and concerns associated with the management of the common property resources. These concerns relate to over use, pollution and depletion of productivity and incomes. Hardin's work has generated considerable debate on strategies to avoid the tragedy of commons (Proceedings of Conference on Common Property Resources Management, 1986). These include the creation of limited property rights (Berkes 1985) demarcation boundaries and regulation of access and use (Cauvin 1979, Johnson and Libecup 1982, Johnson 1979, Runge 1986, Schlager and Ostrom 1987) and designing of institutions to regulate and enforce the norms for use (Johnson 1985, Feeny 1987, Ostrom 1986 and 1987, Wallace 1983).

The inefficiencies in the management of common property fishery resources have attracted considerable attention and ways to regulate the access and rate of exploitation of resources, and to ensure the sustainability of yields have been continuously debated (Gorden 1954, Christy 1966, Sinclair 1978, Wilen 1979, Clark 1976, Johnson and Libecap 1982). In case of inland fishery resources, the issue of compensations to community due to privatization of resources, has been raised (Berkes 1985).

In India also, compulsions of accelerating production, exports and incomes have resulted in a policy framework where these resources have been privatized by giving unequal access to investment, technology and exclusive use of rights to some sections or groups. While the process has increased fish production for domestic markets and exports, it has caused severe problems of declining catch per unit of effort, equity, income distribution, employment and social tensions.

* Dr. U.K. Srivastava is Professor of Economics at the Indian Institute of Management, Ahmedabad, India. He took his Ph.D. degree from Lucknow University in India and did Post-Doctoral Work at Iowa State University, U.S.A. He has authored and co-authored 25 books and more than 30 research papers in professional Journals.

This paper is designed to review the process of growth in both these sub-sectors, assess the impact of policy interventions and analyse the evidence relating to problems arising due to privatization of fishery resources particularly in inland sector. The paper is divided into three sections. Section one deals with the analysis of marine fishery sector. Section two deals with the performance and issues from inland fishery sector and finally section three presents the lessons from privatizing common property resources in fishery sector for policy action.

I. MARINE FISHERY RESOURCES

Physical Resources Available for Exploitation

India has a coast line of 7516 kms. and a continental shelf area of 594 thousand square kilometers (Table 1). India has extended its exclusive economic zone from 12 nautical miles (22 kms) to 212 nautical miles. As plants are the primary producers and their production is limited to the extent of nutrient supply (either through run off from land or through ocean currents and up-welling) and sunlight penetration (euphotic zones) which is effective upto about 100 fathoms, the main geographic area for fishing is limited to the continental shelf, beyond which demersal fishing is difficult because of the sharp increase in depths. Even within the continental shelf, it is the area nearer to the shore, having relatively shallower depths, that has greater productivity.

Marine Fishery Resources

Several estimates have been made about the potential annual substantiable yield from the physical resources mentioned above. Estimated potential varies from 3 million to 4.4 million MT (Table 2), and the current production is still only little over 50% of the estimated yield potential. This production is contributed by motorised boats (30%), small mechanized boats (41%) and traditional non-mechanized boats (29%) (Table 3). There were 8,723 motorized traditional crafts, 19,000 small mechanized boats and .15 million non motorized traditional crafts in operation in 1986.

Strategy for Acceleration Production

The major impetus for accelerating production came from the possibility of export of shrimps which has substantially gone up, particularly in value terms (Table 4), presently they contribute about 85% of total export. Since the impetus came from 'exportable varieties, the strategy for mechanization was primarily geared towards catching of crustacean resources which require mechanized boats and these resources can't be caught by the non-mechanized small boats.

Table-1
Physical Fishery Resources of Maritime States

State	Length of Coast line (kms)	Continental Shelf Area in '000 kms	
		in 0 - 50 m depth zone	in 0 - 200 m depth zone
Gujarat	1,214.7	65	99
Maharashtra	652.6	26	105
Goa	160.5	3	10
Karnataka	280.0	4	25
Lakshadweep	132.0	-	4
Kerala	569.7	13	36
Tamil Nadu	906.9	23	41
Pondichery	30.6	1	1
Andhra Pradesh	973.7	17	31
Orissa	476.4	15	24
West Bengal	157.5	12	23
Andamans Nicobar Islands	1,962.0	-	16
Total	7,516.6	179	415

Source : Handbook of Fisheries Statistics, Ministry of
Agriculture - 1981, 1986.

TABLE-2

ESTIMATED POTENTIAL YIELD AND CURRENT YIELD OF MARINE FISHERY RESOURCES IN INDIA

(Figures in '000 tonnes)

Region	Potential yield by George et al (1977)				Potential yield by Joseph (1984)				Current yield (Average 1980-84)					
	0-50 m	0-200 m	0-70 m	0-200 m	0-70 m	0-200 m	0-70 m	0-200 m	0-70 m	0-200 m				
North West Coast	190	350	540	325	555	880	255	698	953	319	928	1247	241	360
South West Coast	430	270	700	760	660	1420	447	377	824	506	438	944	335	140
West Coast	225	255	480	300	380	680	117	229	346	122	243	365	139	122
Upper East Coast	180	360	540	195	545	740	90	372	462	97	416	513	184	188
Lower East Coast	180	360	540	195	545	740	90	372	462	97	416	513	184	188
Malabar Total	1025	1235	2260	1580	2140	3728	989	1676	2585	1044	2025	3069	819	730
Andhra Deep	-	-	-	55	35	90	-	-	-	-	-	-	3	1
1 & N Islands	-	-	-	130	30	160	-	-	-	51	22	73	2	1
Oceanic Resources	-	-	-	-	-	500	-	-	-	-	-	-	-	-
Total	1025	1235	2260	1765	2285	4470	909	1676	2585	1095	2047	3142	824	732

Sources: P.C. George, et al (1977) and K.M. Joseph (1984, 1987).

Table-3
Marine Fish Production by Mechanized, Motorized and Traditional Type Boats

Year	(Quantity in tonnes)					
	Small Mechanized Boats			Motorized Boats	Total	Traditional Boats
	Trawl	Purseine	Total			
1981	383591	128584	514175	315113	839288	534887
1982-83	496846	81958	578804	312361	890365	516768
1983-84	543376	75261	618637	292974	911611	656928
1984-85	553869 (34.6%)	181424 (6.3%)	655233 (48.9%)	488189 (38.5%)	113422 (71.4%)	458878 (28.6%)
						1373295
						1487125
						1568539
						1682292

Source : Compiled from Marine Fisheries Information Service, T & E No.67, 1986.

Average for 4 years given in brackets.

Quantity in tonnes value
in Rs. Crores

Year	Quantity in tonnes	Value in Rs. crores	Growth Rate	
			Quantity (%)	Value (%)
1972-73	38,983	59.92	+9.52	+34.88
1973-74	52,279	89.51	+34.38	+49.88
1974-75	45,899	68.41	-13.73	-23.57
1975-76	54,464	124.53	28.76	+82.83
1976-77	66,750	189.12	22.56	+5.57
1977-78	65,967	180.95	-1.17	-4.32
1978-79	86,894	234.62	+31.72	+29.66
1979-80	86,401	248.82	-0.57	+5.85
1980-81	75,591	234.84	-12.51	-5.62
1981-82	78,185	286.81	-7.26	+21.79
1982-83	78,175	361.36	+11.51	+26.35
1983-84	92,691	373.82	+18.57	+3.23
1984-85	86,187	384.29	-7.82	+3.82
1985-86	83,651	398.88	-2.94	+3.57

Source : Marine Products Export Development Authority, Cochin.

Therefore, a major plank of policy support has been the introduction of mechanized boats in inshore areas. A break-up of the mechanized boat in operation in percentage term is given as follows:

Trawlers	11,316	60.2%
Gillnetters	3,931	20.9%
Dol Netters	2,895	15.4%
Purse Seiners	428	2.3%
Others	217	1.2%

As the cost of small mechanized boats varied from Rs.0.2 to 0.6 million, a liberal capital subsidy and concessional credit was given to enable the fishermen to buy these boats and put them in operation. (Srivastava and Reddy 1983; Gupta et al 1985). Since these boats required landing and berthing facilities, investments are made to create this facilities. As a result of this, a large number of landing centres for non-mechanized boats gave way to a smaller number of organized landing cum assembly centres. Besides the exploitation of exportable fish resources, the export operations were backed by investments and facilities in processing industry for shrimp (Kulkarni and Srivastava 1985).

Very limited efforts have been made to motorize the traditional crafts and give them access to more distant fishing ground. These efforts were initiated in one maritime state in India (Gujarat). More recently efforts have been made in other two states of India (Kerala and Tamil Nadu).

Due to the policy in mechanization followed in the country, mechanized and motorized boats have emerged as main contributors to the production, though numberwise the non-mechanized small boat still constitute the bulk. The share of catch of non-mechanized boats has gone down from 70% to 30% on a period of 10 years.

More recently with the declaration of EEZ, efforts have been made to introduce large fishing vessels to exploit deep sea resources. The strategy for introduction of these large vessels has been implemented through the charter of fishing vessels. From the Government of India's point of view charter provided an excellent opportunity to assess the commercial viability of fishing operations with large vessels, besides mapping of the fishery resources. Unfortunately, Government was satisfied in receiving reports by the charter vessel. Even when it was detected that the reports were far from being accurate and a provision

incorporated in the charter policy to take a scientist on board, no scientist was available or willing to go on these vessels, mainly because these vessels did not have good living facilities. Subsequent charters were with better built vessels, but provision for sending a scientist on board chartered vessels was not availed of. The second flaw with charter was that it was envisaged initially as an activity in itself. Many found that it was advantageous to charter the largest number of vessels for the largest period to make quick money. This proved to be a great disincentive for acquiring vessels on ownership basis. Even when provisions were incorporated in the agreement with Indian parties whereby they were obliged to purchase vessels within specified periods, many could escape taking advantage of the procedural delays in getting approvals for import, finance etc.

The efforts to generate the Indian fleet were supported by the provision for soft financing upto 90-95% of the cost of fishing vessels at 4.5% interest, repayable over a period of 16 years with a moratorium on payment in the first year, made many to apply for loan for the acquisition of fishing vessels. More recently a subsidy of 33% of indigenously constructed vessels was also made available.

To sum up, the strategy for marine fisheries development mainly included access to investment and technology for mechanized boats to some sections of fishermen. Some of these facilities were availed of by non-fishermen (Kurien 1978, 1980). No efforts were made to regulate the access to fishery either over space/over time. for

Impact of Mechanization

A comprehensive study by Srivastava et al (1986) on the impact of mechanization covering three villages in Gujarat (where substantial amount of motorization also took place) and Karnataka (where a quantum jump took place from traditional technology to purseiners) made the following observations:

- i) both asset and income distribution were less skewed in Gujarat fishery villages as compared to Karnataka fishery villages (Table 5 for the gini ratios for asset and income distribution in both the states);
- ii) but income distribution was less skewed than the asset distribution mainly because mechanized boats require more hired labour to work as a crew;
- iii) the incomes of crew members in mechanized boats were substantially higher than the owners of the traditional country craft;

Table-5

Gini Ratios for Asset and Income Distribution in Selected Villages : Gujarat and Karnataka (1982)

State/Village	Gini ratio for asset distribution	Gini ratio for income distribution
Gujarat		
Chorwad (Highly mechanized village)	0.6025	0.3204
Hirakot (Medium mechanized village)	0.5646	0.1973
Bhadbhut (Low mechanized village)	0.3277	0.2345
Karnataka		
Kadekar (Highly mechanized village)	0.8265	0.5048
Bengre (Medium mechanized village)	0.8122	0.3136
Idya (Low mechanized village)	0.6151	0.3135

Source : Srivastava, et al. Impact of Mechanization on Small Fishermen (1986).

Note: The Gini coefficient is a ratio computed for quantifying the distributive inequality and is widely used for studying the extent of inequality in assets or income distribution. The Gini ratio ranges between 0 and 1. The zero value of the ratio indicates the perfectly equitable distribution while the value one indicates most inequitable distribution.

- iv) in general income inequality was much less in Gujarat villages as a result of mechanization as compared to Karnataka villages where quantum jump took place from traditional technology to purseiners;
- v) the major contribution of mechanization was observed to be the development of assembly-cum-landing centres and a shift in the marketing activity. This has aided in the development of market yards, ice and cold storage facilities, freezing and canning plants, fishmeal plants and transport facilities. The development of the assembly-cum-landing centres also contributed to the change in the structure of fish markets at the small landing centres and assembly-cum-landing centres. The lower volume of catches in the village landing centres now attracted very few traders and this contributed to the development of an oligopolistic market situation.
- vi) Market intermediaries such as commission agents and wholesalers, while they are essential for reason of finance and development of distant markets, controlled the flows to the markets and thus prices in the primary and terminal markets. In this process the traditional small fishermen usually got by-passed and often were at a disadvantage.
- vii) One important consequence of growth of mechanized fishing was the growth of industrial capitalism. In order to popularise mechanization and argument production government provided various subsidies to own mechanized crafts. This lured large numbers of non-fishermen entrepreneurs into fishing. Many who had initially entered merely as merchant capitalist gradually ventured into fish production (Mohan 1980).

In order to minimize the possible adverse effects of mechanization on ownership pattern of capital and distribution of income, the Government sought to bring the mechanized sector of fishing under cooperative sector in few states of the country (especially in Kerala). But these safeguards were not effective (Ibrahim 1987). The cooperative died a premature death, mechanized boats passed into the possession of absentee-owners of traders or businessmen whose main stay were outside fishing. For them cooperative became the main vehicle for penetration into fishery sectors.

In case of the charter arrangements for the exploitation of deep sea resources in the EEZ, no specific long run advantages accrued to fishermen community. All the catches were sold to charter parties on the high seas and domestic fishermen and consumers were not benefitted by the exploitation of these common property resources.

Conflicts of Interests

So long as the mechanized boats confined their operation to areas conventionally outside the fishing ground of traditional crafts, exploitation of fishery resources did not present much problems. The high cost of diesel, oil and lubricants caused high operating cost and uncertainty of exportable resources in deeper waters, instead of going to deep sea, most of the mechanized boats have started fishing as close to the shore as possible. A series of conflicts began to appear in the traditional sector when the mechanized sector, faced with prospects of dwindling resources of prawns began to encroach upon the resources of traditional fisherman and pose to them the problem of declining catches, employment and income. Also conflicts arose because of damages caused by mechanized boats to the nets of traditional crafts and also the reduction of catches of the traditional crafts due to better hauling power of mechanized boats.

II. INLAND FISHERIES

Physical Resources

Inland Fishery resources of the country are potentially one of the richest in the world. They are broadly classified into two types: freshwater and brackish water resources. The fresh water resources include tanks and ponds (1.6 m ha), reservoirs (3.0 m ha) and rivers (27, 359 kms). Similarly, the brackish-water resources (1.42 m ha) are further classified into ponds for culture (0.9 m ha), farms for capture/filtration, lakes and swamps and estuaries (0.52 m ha). All these resources are common property resources. For example, tanks and ponds are owned by village panchayats* and in some cases irrigation departments. All reservoirs are owned by the irrigation departments of the state governments and fishing right are vested with fisheries department of the state governments. The rivers are also common property, theoretically accessible to all.

Yield Potential and Imperatives for Accelerating Production

Production from the Inland fishery resources is low and it contributes about 1 million tonne to total production. Bulk of this production is merely from capture from flowing water rather than scientific culture (in which seeds, feed are used as inputs to realize the yield potential).

The per capita availability of fish in India is estimated to be 3.5 kg. which is one of the lowest in the world. Also the increase in wholesale price of index of fish has been much more rapid than the price of all

* Local bodies

commodity and food articles. During the 33 years period from 1953 to 1985 while the wholesale price indices of all commodities has gone by 7.6 times, food articles by 6.7 times, meat by 12.7 time, the fish price went up by 18.0 times.

A recent study indicated that the demand - supply gap of fish in domestic market estimated at 1 million tonnes (Gupta et al, 1985) in 1985 is to widen considerably by the end of this century, even when a conservative demand estimate is put at 12.5 million tonnes. To meet this, marine catch is not expected to contribute more than half of the projected demand (Srivastava and Vathsala, 1986). The balance would have to come from inland fisheries sector. In case of inland fisheries sector, the required increase was seven times in the next two decades as against the growth of 3 times during the last 3 decades. Although inland production was about 1/3 of the total fish production, it supplied about 57% of the domestic demand.

The yield potential of tanks and ponds brackishwater and reservoirs is illustrated below. Theoretically it is possible to produce about 19 million tonnes of fish per annum from the inland water bodies assuming the productivity of ponds, and brackishwater is 5 mt. and the reservoir is 150 kg. per annum. gainst this current level of productivity is only 1/20 of the theoretical productivity. The scope for riverine fishery development is very limited. Rivers indicates declining catches per kilometers of the area due to over exploitation.

PRIVATIZATION PROCESS

Ponds and Tanks

The realization of above yield potential requires investment and whoever is to make this investment has to be assured of ownership atleast for a reasonable period of time. In case of tanks and ponds it has been indicated that a 10 year period is the most desirable period to recover the investment. Since the yield potential has to be realized, community ponds and tanks are being given on lease to selected fishermen so that they can be made investment and raise their incomes.

Since the primary concern is to increase production and raise the incomes of the rural poor the lease rents are kept so small that they have no relation with the profit realized by those who are granted access to the community resources on a privatized basis. For example, a study by K.R. Narayanan et al (1986) indicated at the present lease of Rs.250 per hectare in Gujarat can be increased to Rs.2500 (10 times) and still the fishermen would get a very high rate of return of over 50%. The fishermen are also given subsidies and input, and technical guidance at free of cost. This also help them

to realize high profits, even at lower yields than feasible.

In the process of this privatization of resources a conflict gets in generated between the owners of the resources (community bodies) and those who are the beneficiaries of privatization. While the community members at large are deprived of access to these resources, they stand to benefit very little by way of lease rent. Similarly, when other dominant communities in the village observe the profits of fish aquaculture they also begin to create problems for the poorer fishermen who were given the tanks and ponds earlier. Thus, in the process of accelerating production by privatizing community resources new social tensions are introduced. It has been also observed that crimes of poaching from the privatized ponds have also become every day occurrence.

Reservoirs

Unlike the fresh water and brackish water ponds, where all the investment is made by the lease holders, in case of reservoirs the stocking is done by Department of Fisheries and only harvesting is done by the beneficiaries of lease/royalty or any other arrangements. Therefore, the broad objectives of the leasing system in case of reservoirs can be summarized as follows (Srivastava 1987).

- a) To facilitate development of the reservoir to increase productivity
- b) To facilitate and provide resources for the development of reservoir
- c) To enable the fishermen to get a good return on their catches
- d) To facilitate the compilation of production data
- e) To provide a good base for marketing of fish.

The above objectives imply that the leasing system to be followed in a reservoir should not only generate revenue but also should incorporate conservation, regulatory and stocking provisions.

The period of lease which is currently for one year may be increased for longer time span (say 3 to 5 years) so that the agency getting fishery rights can better plan the production and marketing arrangements. Annual leases have the following demerits:

- i) The contractor's aim is just to capture as much fish as possible.
- ii) The contractor has no interest to ensure necessary fish seed stocking since he is not interested in sustained yields.
- iii) The contractor's overhead managerial costs of arranging fishing operations is high and so he can

offer lesser royalty to the government on fish catch and/or lower fishing charges to fishing labour.

Leasing systems generally follow the trends of fish production, income and expenditure of the department, socio-economic status of fishermen and above all, the government policy towards cooperative sector. Different states have different leasing systems depending upon the conditions prevailing in the state, and their fishery resources. Even within a state, the system differs from reservoir to reservoir. Also the leasing system varies at different points of time for the same reservoir. The leasing system followed across the country shows that Andhra Pradesh, Karnataka, Maharashtra, Orissa and Himachal Pradesh attach importance to the cooperative sector. While Madhya Pradesh, Tamil Nadu, West Bengal and Gujarat attach importance to State Fisheries Development Corporation (SFDC) and Bihar, Rajasthan and Uttar Pradesh seem to prefer the open auction system.

It appears that production levels can be constantly maintained whenever the reservoir is entrusted to an official agency, for example, Corporation or Federation. Such a system exists in Gobind Sagar, Kadana, Panam, Gandhisagar, Maniari, Jaisamand and Sathanur reservoirs. The system of fixing quota targets followed by some states imposes an effective control on the contractors from over-exploitation.

Under some leasing systems the production data could be compiled accurately, whereas in some other systems the production data could not be recorded properly. Whenever an official agency like Corporation, Federation, or Department undertakes weighing the catch and collecting royalty either from the contractor or cooperative societies, there is an inbuilt motivation to record the catch. In a free licence system or licence fishing, the official agency is not interested in recording the catch. The control exercised by the official agency in the latter system is also minimum, and more so in recording stocking, poaching, or adhering to conservation and regulatory provisions.

The system of open auction with quota targets ensures a good revenue to the official agency. This is true of U.P. and Rajasthan. The system of royalty, with or without licence fee followed at Gobindsagar and Pongadam also gives good revenue to the Department. In the reservoirs where licensing alone is restored to the revenue of the department is usually small. In cases where revenue is large, official agency has an obligation to do stocking, to provide infrastructure facilities, and to help the fishermen in terms of fishery requisites.

Brackish Water Resources

Most of the potential areas (near the sea coast), which

have the potential for excavation as ponds for prawn and fish culture, are again publically owned (1.4 million hectares, of which 0.9 million hectares are cultivable). Some of them are classified as forest land (even though there is no forest at the moment). These lands have to be leased to potential fish farmers. Here, the following important characteristics have to be kept in mind in deciding about leasing policy (Srivastava, Dholakia and Vathsala 1987):

- 1) The brackish water aquaculture is highly capital intensive. For example, a recent estimate of constructing a cluster of 100 ha. of pond area came to Rs.57.7 lakhs. The tidal and ph conditions etc. in Gujarat suggest that the brackish water ponds have to be based on pumped water supply and pumping facilities are not divisible. Therefore, we have to go for cluster of ponds of a minimum size, say minimum of 100 hectares (with one to two ha. partitions) and water supply through a common feeder canal. Furthermore, there are scale economies in the management and maintenance costs. It means if we compare the operating cost of a 50 hectare pond cluster and a 100 hectare pond cluster, the operating cost per hectare of the latter is less than the former.
- 2) It has been estimated that the lease duration of about 30 years is required to make the proposition attractive to fish farmers so that they can recover their fixed cost along with acceptable rate of return.
- 3) Keeping in view, the Gujarat conditions and the points mentioned (1) and (2) above, it may be worthwhile to encourage the private sector companies to take up the development of these resources. Even if a part of these resources is reserved for the benefit of a small and poorer fish farmers, it is not possible and advisable to lease the area to individuals for excavation of ponds for prawn and fish culture because they would not be able to invest and operate the technology at profitable level. Therefore, it is necessary to think of in terms of something like Brackish Water Fish Farmers Development Agency (BFDA) which can be given lease for construction and maintenance of the ponds on behalf of fish farmers. The BFDA can in turn lease one to two hectare ponds after construction to fish farmers. The proposed BFDA may undertake the following functions:
 - a) Organizing the micro survey for selection of suitable areas and sites. It is suggested that BFDA involves some of the existing organization like MPEDA for this task.
 - b) Construction of farms and nurseries.
 - c) Maintenance of ponds.
 - d) Supply of seed and feed to the farmers.

- e) Water management covering flow, salinity, circulation, temperature, pH, etc.
 - f) Guiding farmers in harvesting and marketing.
 - g) Selection and training of farm management team, technical team and farmers.
 - h) Managing finance and credit.
 - i) Coordination activities.
 - j) Monitoring and evaluation of project.
- 4) The amount of lease per hectare will have to be fixed keeping in mind the high capital cost of brackish water ponds in Gujarat and lower returns than other states because of a lack of P. Monodon prawn seeds in Gujrat. It has, however, been demonstrated that BFDA can recover a lease rent upto Rs.9,500 per hectare per year which is sufficient to repay the principal amount, interest on fixed and working capital and also to meet operating and maintenance cost of common facilities.

III. LESSONS OF PRIVATIZING COMMUNITY RESOURCES OF MARINE AND INLAND FISHERIES FOR POLICY ACTION

Marine Fisheries

A vast potential for export and a large unsatisfied demand in the domestic market would continue to exercise pressure for accelerating production. The analysis of past experience, however, indicates certain areas for policy action which can minimize the adverse effect of privatization of community resources for production. These are indicated below.

- i) Whenever possible a gradual transition from traditional fishing craft to mechanized boats be supported. In this context the efforts to motorize the traditional crafts (with outboard motors-OBMs) need to be accelerated. There are several advantages in favour of motorization of the traditional crafts, such as, economic efficiency, favourable income, increased employment and increased availability of fish for domestic consumption. The introduction of OBM boats also did not change structure of the output market at village landing centres.
- ii) The policies with respect to credit, subsidies and distribution of small mechanized boats be reoriented such that broad based ownership of these boats is created.
- iii) In order to accelerate the growth of mechanization it would also be necessary to consider changes in the policies relating to the manpower training and marketing infrastructure. First, as of now the process of entrepreneur development amongst fishermen is quite slow. In order to accelerate change, it would be essential that more and more entrepreneurs come forward

development and growth of mechanization. Such a training may be highly required particularly in view of the possibility of the development of deep sea fishing, which will require large-sized crew fully trained in the different mechanical operations. Non-availability of trained manpower is even today considered as one of the important impediments in the development of marine fisheries. Second, it is important to take appropriate policy decision for development of marketing infrastructure facilities.

- iv) Legal framework has to be evolved to ensure that mechanized boats do not fish in the inshore areas where they hurt the interest of non-mechanized boat owners. As it is, the catch per unit effort in case of non-mechanized boat is rapidly going down and this has led to be contribution of this sector declined to only 30% of the total catch.
- v) As inshore areas show signs of over capitalization and catch has been stagnant during the last 3 or 4 years it is now time to put a restriction in addition of small mechanized boats.
- vi) In case of deep sea vessels it is necessary to generate own fleet which will provide more employment opportunities in the processing and marketing of catches. This can further result into broad based benefit to the community from the common property resources than observed in case of charter boats in this purpose.
- vii) The poor economic condition of non-mechanized traditional craft owners is due to under employment and unemployment during the off season. This can be mitigated only by creating employment opportunities during the off season.

Inland Fisheries

Although imperative of accelerating investment and production from inland sector necessitates privatization of access to physical resources, it is necessary that a congruence of interest between the community as a whole and beneficiaries of privatization needs to be built. Also the policy framework should ensure growth in productivity of water bodies. In this context the following recommendations have been made for privatizing the common property resources for inland fisheries production.

-
1. The Pioneering work was done by Kalwar A.G., Devaraj.M, and Arun H. Parulekar. (see Kalawar et.al.,1985)

a) Fresh Water Ponds

- i) The duration of lease be 10 years (with adequate safeguards to ensure that the leased waterbody would indeed be used for fishery development) and the procedure for granting the lease should be simplified.
- ii) The lease rent should be kept at reasonably high level so the adequate compensation may be built for public bodies leasing the resource to private beneficiaries. It has been demonstrated that fresh water aquaculture small ponds can sustain with 8 to 10 times of the present lease rent.

b) Brackish Water Ponds

- i) The duration of the lease has to be raised about 30 years.
- ii) Since it is highly capital intensive and managerial resources make substantial difference for efficiency, it is necessary to encourage the private sector involvement in exploitation of these resources.
- iii) If it is decided to earmark a small portion of brackish water land for leasing to small and poor farmers, the lease can only be given to some agency like BFDA which in turn can construct the ponds with 1 to 2 hectare partition for leasing to small and poor farmers.

c) Reservoirs

- i) The leasing policy for reservoir has to encompass the entire system right from seed production and stocking and regulatory and conservation measures to harvesting and marketing.
- ii) There is a need to set up one agency to undertake the stocking, enforce conservation and regulatory measures and collect lease/royalty amount from the beneficiaries.
- iii) It is advisable to put lease duration to 3 to 5 years.
- iv) Ideally one should strive for royalty on weight basis of catch rather than flat rate. If, however, a flat rate of lease is chosen due to ease of administration then it is advisable to link it up with strong system for the stocking of seeds, and

enforcement of regulatory and conservation measures.

Similar congruence of interest can be generated by organizing the processing and marketing activities for fish production and generating employment opportunity to other members of the community.

Thus, while the privatization of common property resources of both marine and inland fisheries are necessary for accelerating production of fish for domestic market and exports, the challenge lies in evolving policies and projects for improving the lot of those who are adversely affected due to privatization of these resources restricting the access to a few members of the community. At the same time, the productivity of resources need to be raised manifold which is technologically feasible.

References

- Berkes, F. "The Common Property Resources problem and the Creation of Limited Property Rights", Human Ecology, Vol.13, No.2, pp.187-208, 1985.
- Cauvin, D.M. "Regulating Access in Canada's Inland Fisheries", Journal of the Fisheries, Research Board of Canada, Vol.36, 1979, pp.827-836.
- Clark, Collin W. "Mathematical Bioeconomics", New York, John Wiley & Sons, 1976.
- Christy Francis, T. The Common Wealth to Ocean Fisheries : Some Problems of Growth and Economic Allocation, Published by Battiman John for Resources for the Future, Hopkins Press, 1966.
- Feeny, David. "Institutional Design and Innovation : Discussion", American Journal of Agricultural Economics, Vol.69, No.2, May 1987.
- George, P.C., et. al. "Fishery Resources of the Indian Exclusive Economic Zone", Sovenir, Silver Jubilee, IFF, Cochin, October 1977, pp.70-116.
- Gorden, H. Scott. "The Economic Theory of a Common Property Resource : The Fishery", Journal of Political Economics, Vol.62, 1954, pp.124-142.
- Gupta, V.K. et. al. Marine Fish Marketing in India, Indian Institute of Management, Ahmedabad, 1985.
- Hardin, Garrett. "The Tragedy of the Commons", Science, Vol.162, pp:1243-48, 13 December 1986.
- Ibrahim, P. Fishing Industry in Kerala : A Study on the Impact of Technological Change, Unpublished Ph.D. Thesis, Kerala University.
- Jodha, N.S. "Common Property Resources and Rural Poor in Dry Regions of India", Economic & Political Weekly, Vol.21, No.27, 5th July 1986.
- Jodha, N.S. "Market Forces and Erosion of Common Property Resources", ICRISAT, International Workshop at ICRISAT, A.P., India, pp.263-277, 1983.
- Johnson, R.N. and Libecap G.D. "Contracting Problems and Regulation: The Case of the Fishery", American Economic Review, 72 (1982): 1005-22.

Johnson, T. "Work Together, Eat Together : Conflict and Conflict Management in a Portuguese Fishing Village, North Atlantic Maritime Cultures", Anthropological Essays on Changing Adaptions, Raoul Anderson (ed.), New York : Mouton Publishers, 1979.

Joseph, K.M. "The Resources of the Indian Exclusive Economic Zone", MSS National Seminar on Planning Export Strategy for Indian Marine Fisheries, New Delhi, March 1987.

Joseph, K.M. "Marine Fisheries Resources of India", in Kulkarni G.R. and Srivastava U.K. (eds.) Systems Framework of Marine Foods Industry in India, Concept Publishing Co., New Delhi, 1984, pp.990-1149.

Kalwar A.G., Devaraj.M, and Arun H. Parulekar "Report of the Expert Committee on Marine Fisheries in Kerala", Report submitted to the Government of Kerala on 19th May, 1985.

Korankundy, R. "Evolution of a New Structure in Fishing Industry", Sea Food Export Journal, Vol.9, No.21, p.7, December 1977.

Kulkarni, G.R. and Srivastava, U.K. (eds.). A System Framework of Marine Foods Industry in India, New Delhi: Concept Publishing Co., 1985.

Kurien, J. "Entry of Big Business into Fishing : Its Impact on the Fish Economy", Economic and Political Weekly, 1.1.13(30), pp.1557-65, July-September 1978.

Kurien, J. "Social Factors and Economic Organization of the Traditional Small Scale Fishermen of India", Social Action, 30 (2), 1980.

Mohan, K.P. "The Situation of Indian Fishing Industry and Indian Fishermen", in Concern, ISIS Documentation Centre, Bangalore, 1980.

National Research Council, Office of International Affairs, Proceedings of the Conference on Common Property Resource Management, (April 21-26, 1985), Washington, D.C., National Academy Press, 1986.

Ostrom Elinor. "The Implications of the Logic of Collective Action for Administrative Theory", Workshop on Political Theory and Policy Analysis at Indiana University, p.43, March 1987.

Ostrom Elinor. "How Indexorable is the Tragedy of the Commons? Institutional Arrangements for Chaning the Structure of Social Dilemmas", Distinguished Faculty Research Lecture, Indiana University, p.35, 1986.

Johnson Ronald V. "Restraint under Open Access: Are Voluntary

Incentives Sufficient or is Coercion Required? Discussion", American Journal of Agricultural Economics, Vol.67, No.2, May 1985.

Runge Carlisleford. "Common Property and Collective Action in Economic Development", World Development, Vol.14, No.5, pp.623-35, 1986.

Schlager Eldella and Ostrom Elinor. "Common Property, Communal Property and Natural Resources: A Conceptual Analysis", Presented at the Workshop on Political Theory and Policy Analysis at Indiana University, January 1987.

Sen Amartya K. "Isolation, Assurance and the Social Rate of Discount", Quarterly Journal of Economics, No.81, pp.112-124.

Sinclair, W.F. "Management Alternative and Strategic Planning for Canada's Fisheries", Journal of the Fisheries Research Board, Vol.35, 1978, pp.1017-1030.

Srivastava, U.K. "Considerations in Evolving a Comprehensive Leasing Policy for Inland Waterbodies for Fish Production, W.P. No.694, Indian Institute of Management, Ahmedabad, September 1987.

Srivastava, U.K. et al. Inland Fish Marketing in India, New Delhi: Concept Publishing Co., 1986.

Srivastava, U.K. and Vathsala, S. (eds.) "Strategy for Development of Inland Fishery Resources in India", New Delhi: Concept Publishing Co., 1985.

Srivastava, U.K. "Brackish Water Aquaculture Development in India", New Delhi: Concept Publishing Co., 1987.

Srivastava, U.K. and Dharma Reddy M. (eds.) Fisheries Development in India : Some Aspects of Policy Management, New Delhi : Concept Publishing Co., 1983.

Srivastava, U.K. et al. Impact of Mechanization on Small Fishermen : Analysis and Village Studies, New Delhi: Concept Publishing Co., 1985.

Wallace Michael B. "Managing Resources that are common Property - From Kathmandu to Capitol Hill", Journal of Policy Analysis and Management, Vol.3, No.2, pp.220-37, 1983.

Wilén, James E. "Fishermen Behaviour and Design of Efficient Fisheries Regulation Programs", Journal of the Fishery Research Board of Canada, Vol.36, 1979, pp.855-58.